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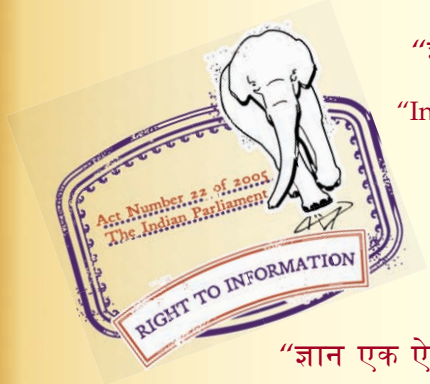

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Indian Standard

SPECIFICATION FOR CRANE-SUSPENDED LADLES FOR FOUNDRIES

PART 1 STRAIGHT/TAPER SIDED GEARED LADLES 0.25 TO 10 TONNES FOR IRON AND STEEL FOUNDRIES

(Second Revision)

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Indian Standard

SPECIFICATION FOR CRANE-SUSPENDED LADLES FOR FOUNDRIES

PART 1 STRAIGHT/TAPER SIDED GEARED LADLES 0·25 TO 10 TONNES FOR IRON AND STEEL FOUNDRIES

(Second Revision)

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Indian Standard

SPECIFICATION FOR CRANE-SUSPENDED LADLES FOR FOUNDRIES

PART 1 STRAIGHT/TAPER SIDED GEARED LADLES 0·25 TO 10 TONNES FOR IRON AND STEEL FOUNDRIES

(Second Revision)

0. FOREWORD

0.1 This Indian Standard (Part 1) (Second Revision) was adopted by the Indian Standards Institution on 27 May 1986, after the draft finalized by the Foundry Sectional Committee had been approved by the Structural and Metals Division Council.

0.2 This standard was first published in 1967 with a view to provide an economic degree of standardization in ladle capacities and dimensions, and to ensure that the design and construction provide the maximum efficiency, safety and the minimum of maintenance in iron foundries, and was subsequently revised in 1975.

0.2.1 As a result of experience gained during these years, it was decided to cover ladles for iron and steel foundries from capacity 0·25 to 50 tonnes in this revision. Depending upon the type, use and capacity, it was found convenient by the Sectional Committee to give more detailed requirements of these ladles in the following four parts of the standard:

Part 1 Straight/taper sided geared ladles 0·25 to 10 tonnes for iron and steel foundries,

Part 2 Cylindrical geared ladles 0·25 to 3 tonnes for iron foundries,

Part 3 Straight sided ladles 0·25 to 3 tonnes for SG iron foundries, and

Part 4 Taper sided non-geared ladles 15 to 50 tonnes for iron and steel foundries.

0.2.2 The provisions of this standard shall supersede the relevant provisions of straight/taper sided geared ladles up to 10 t from IS : 4476 - 1975*. After publication of all the above four parts, IS : 4476-1975* shall be withdrawn.

0.3 This standard (Part 1) covers both tapered shell and straight shell ladles. It is for the foundries to select design of ladles according to their convenience and requirements. It also covers lip pouring and tea spout pouring for iron foundries; and bottom tap pouring ladles for steel foundries.

0.4 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960†. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard (Part 1) covers the requirements for crane-suspended hand-operated geared ladles (both tapered and straight shell design) suitable for iron and steel foundries, supplied in the following forms:

a) Open-top (*see* Fig. 1 and 2) for ladle capacity from 0·25 to 10 tonnes:
   1) For taper sided ladle,
   2) For straight sided ladle, and

b) Covered ladle (*see* Fig. 3) for capacities from 0·25 to 2 tonnes only.

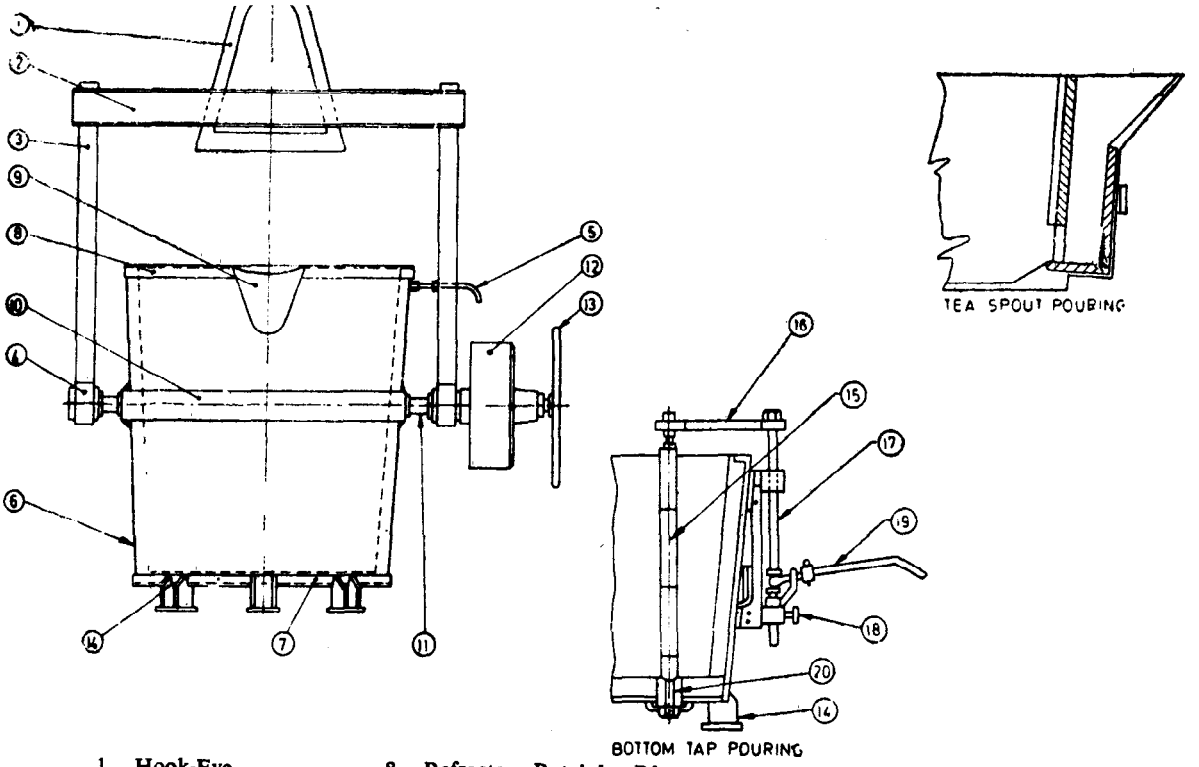
2. CAPACITIES AND DIMENSIONS

2.1 Ladles covered by this specification for iron foundries shall have capacities specified in Tables 1 and 2. For steel foundries, the corresponding figures are in Tables 3 and 4. The capacity of a ladle shall be its liquid iron capacity (excluding slag) when lined. For open-top ladles the minimum top allowance above liquid metal shall be as given in Tables 1 and 3. For covered ladles the corresponding values are given in Tables 2 and 4.

2.2 Table 5 gives shell dimensions for ladles of given liquid iron capacities and Table 6 gives shell dimensions for liquid steel capacities. Manufacturers may supply ladles of slightly different dimensions, provided that the liquid iron and steel capacities of the ladles are equal to those specified in Tables 5 and 6. In these tables the density of liquid iron has been assumed to be 6·593 g/cm³, and the density of liquid steel as 6·89 g/cm³.

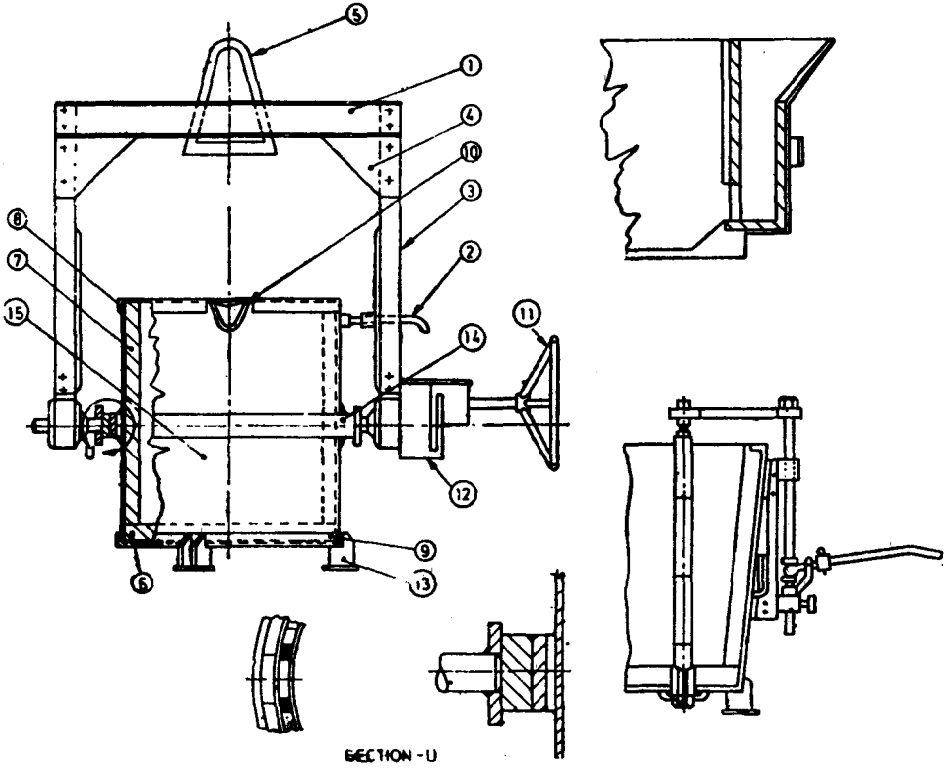
*Specification for crane-suspended hand-operated geared ladles for steel foundries (*first revision*).

†Rules for rounding off numerical values (*revised*).



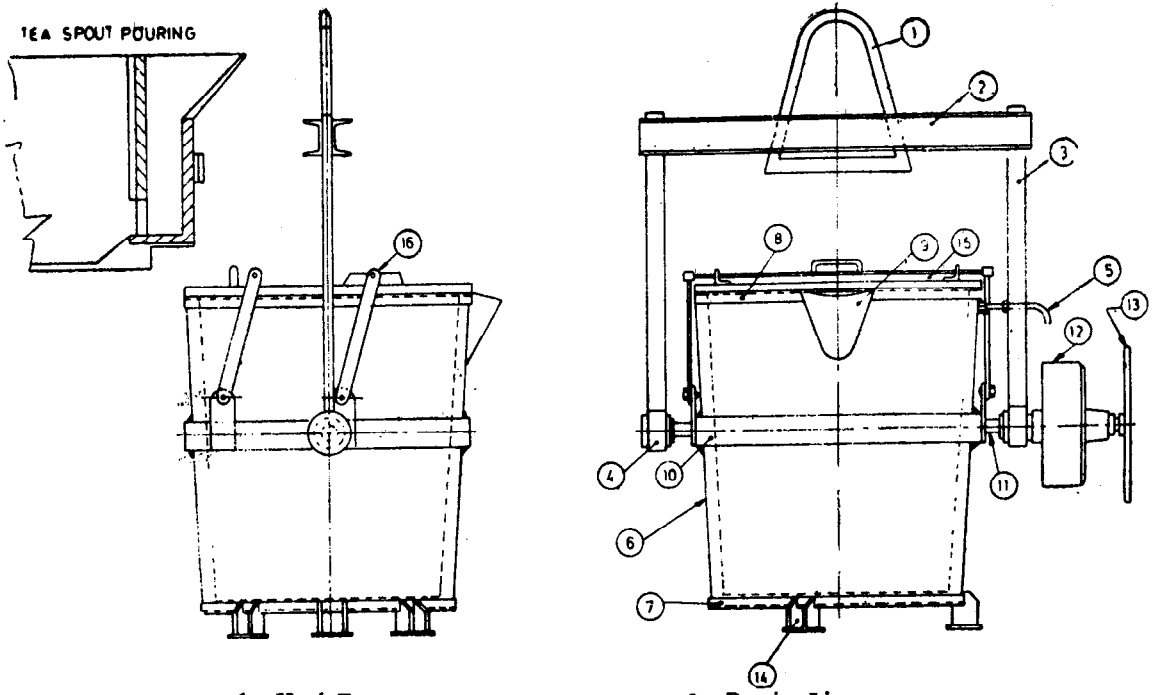
1. Hook-Eye
2. Top Members
3. Side Members
4. Trunnion Carriers
5. Safety Catch
6. Sides
7. Bottom
8. Refractory Retaining Ring
9. Pouring Lip
10. Body Holding Ring
11. Trunnions
12. Tilting Gear
13. Operating Wheel
14. Feet
15. Stopper Rod
16. Stopper Rod Carrier
17. Slide
18. Locating Peg
19. Swivel Operating Lever
20. Pouring Nozzle

FIG. 1 TAPER SIDED LADLE



1. Bail Cross Members
2. Locking Devices
3. Bail Arms
4. Gussets
5. Hook
6. Refractory Bottom
7. Refractory Side
8. Top Angle Ring
9. Bottom Angle Ring
10. Lip
11. Hand Wheel
12. Gear Box
13. Feet
14. Trunnion Ring
15. Shell

FIG 2. STRAIGHT SIDED LADLE



1. Hook-Eye
2. Top Members
3. Side Members
4. Trunnion Carriers
5. Safety Catch
6. Sides
7. Bottom
8. Refractory Retaining Ring
9. Pouring Lip
10. Body Holding Ring
11. Trunnions
12. Tilting Gear
13. Operating Wheel
14. Feet
15. Cover
16. Link

FIG. 3. COVERED LADLE

TABLE 1 CAPACITIES, REFRACTORY LINING THICKNESSES AND MINIMUM TOP ALLOWANCES ABOVE LIQUID METAL OF OPEN-TOP TYPE LADLES FOR IRON FOUNDRIES

(*Clause* 2.1)

Sl No.	Capacity	Taper Sided Ladles			Straight Sided Ladles		
		Mean Thickness of Refractory Lining		Minimum Top Allowance Above Liquid Metal	Mean Thickness of Refractory Lining		Minimum Top Allowance Above Liquid Metal
		Side	Bottom		Side	Bottom	
(1)	(2) t	(3) mm	(4) mm	(5) mm	(6) mm	(7) mm	(8) mm
i)	0·25	40	40	75	40	40	75
ii)	0·5	40	40	75	40	40	75
iii)	0·75	40	40	75	40	40	75
iv)	1·0	40	50	75	40	50	75
v)	1·5	40	50	100	40	50	100
vi)	2·0	50	50	100	50	50	100
vii)	3·0	50	80	130	50	90	130
viii)	4·0	65	90	150	65	90	150
ix)	5·0	113	113	150	113	113	150
x)	6·0	113	113	150	113	113	150
xi)	7·0	113	113	150	113	113	150
xii)	8·0	113	113	180	113	113	180
xiii)	10·0	113	113	180	113	113	180

TABLE 2 CAPACITIES, REFRACTORY LINING THICKNESSES AND MINIMUM TOP ALLOWANCES ABOVE LIQUID METAL OF COVERED LADLES FOR IRON FOUNDRIES

(*Clauses* 2.1 *and* 4.6.2)

Sl No.	Capacity	Taper Sided Ladles			Straight Sided Ladles		
		Mean Thickness of Refractory Lining		Minimum Top Allowance Above Liquid Metal	Mean Thickness of Refractory Lining		Minimum Top Allowance Above Liquid Metal
		Side	Bottom		Side	Bottom	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	t	mm	mm	mm	mm	mm	mm
i)	0·25	40	40	75	40	40	75
ii)	0·5	40	40	75	40	40	75
iii)	0·75	40	40	75	40	40	75
iv)	1·0	40	50	75	40	50	75
v)	1·5	40	50	100	40	50	100
vi)	2·0	50	50	100	50	50	100

TABLE 3 CAPACITIES, REFRACTORY LINING THICKNESSES AND MINIMUM SLAG ALLOWANCES OF OPEN-TOP TYPE LADLES FOR STEEL FOUNDRIES

(*Clause* 2.1)

Sl No.	Capacity	Taper Sided Ladles			Straight Sided Ladles			
		Refractory Lining Mean Thickness		Slag Allowance, *Min*	Refractory Lining Thickness			Slag Allowance, *Min*
		Side	Bottom		Side		Bottom	
					At the top of the shell	At the bottom of the shell		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	t	mm	mm	mm	mm	mm	mm	mm
i)	0·25	50	75	100	75	135	113	125
ii)	0·5	50	75	100	75	135	113	125
iii)	0·75	50	75	100	75	135	113	125
iv)	1·0	50	75	125	75	135	113	150
v)	1·5	50	75	125	75	135	113	150
vi)	2·0	75	113	150	75	135	113	200
vii)	3·0	75	113	200	75	135	113	200
viii)	4·0	113	185	200	113	185	113	200
ix)	5·0	113	185	225	113	185	185	225
x)	6·0	113	185	225	113	185	185	225
xi)	7·0	113	185	250	113	185	185	250
xii)	8·0	113	185	250	113	185	185	250
xiii)	10·0	113	185	250	113	185	185	250

TABLE 4 CAPACITIES, REFRACTORY LINING THICKNESSES AND MINIMUM SLAG ALLOWANCES OF COVERED LADLES FOR STEEL FOUNDRIES

(*Clauses* 2.1 *and* 4.6.2)

Sl No.	Capacity	Taper Sided Ladles			Straight Sided Ladles			
		Refractory Lining Mean Thickness		Slag Allowance, *Min*	Refractory Lining Thickness			Slag Allowance, *Min*
		Side	Bottom		Side		Bottom	
					At the top of the shell	At the bottom of the shell		
(1)	(2) t	(3) mm	(4) mm	(5) mm	(6) mm	(7) mm	(8) mm	(9) mm
i)	0·25	50	75	100	75	135	113	125
ii)	0·5	50	75	100	75	135	113	125
iii)	0·75	50	75	100	75	135	113	125
iv)	1·0	50	75	125	75	135	113	150
v)	1·5	50	75	125	75	135	113	150
vi)	2·0	75	113	150	75	135	113	200

TABLE 5 SHELL DIMENSIONS OF LIP POURING OPEN-TOP TYPE LADLES AS WELL AS OF COVERED LADLES FOR IRON FOUNDRIES

(*Clause* 2.2)

Sl No.	Capacity	Internal Shell Dimensions				
		Taper Sided Ladles			Straight Sided Ladles	
		Diameter		Depth	Diameter	Depth
		Bottom	Top			
(1)	(2)	(3)	(4)	(5)	(6)	(7)
	t	mm	mm	mm	mm	mm
i)	0·25	360	465	560	460	465
ii)	0·5	535	610	610	550	555
iii)	0·75	580	665	635	610	635
iv)	1·0	635	715	715	675	700
	1·5	715	815	815	760	800
vi)	2·0	790	890	890	865	895
vii)	3·0	915	1 045	1 045	960	1 010
viii)	4·0	985	1 140	1 140	1 050	1 170
ix)	5·0	1 180	1 320	1 320	1 280	1 240
x)	6·0	1 220	1 350	1 350	1 280	1 330
xi)	7·0	1 250	1 400	1 400	1 295	1 500
xii)	8·0	1 280	1 490	1 490	1 350	1 535
xiii)	10·0	1 360	1 580	1 580	1 425	1 700

TABLE 6 SHELL DIMENSIONS OF BOTTOM POURING OPEN-TOP TYPE AS WELL AS COVERED LADLES FOR STEEL FOUNDRIES

(*Clause* 2.2)

Sl No.	Capacity	Internal Shell Dimensions				
		Taper Sided Ladles			Straight Sided Ladles	
		Diameter		Depth	Diameter	Depth
		Top	Bottom			
(1)	(2)	(3)	(4)	(5)	(6)	(7)
	t	mm	mm	mm	mm	mm
i)	0·25	510	410	600	570	620
ii)	0·5	610	535	685	660	715
iii)	0·75	660	600	710	715	820
iv)	1·0	715	660	765	760	915
v)	1·5	840	660	995	845	1 000
vi)	2·0	870	790	1 070	915	1 145
vii)	3·0	1 080	925	1 110	1 015	1 240
viii)	4·0	1 220	1 090	1 300	1 200	1 290
ix)	5·0	1 295	1 140	1 395	1 300	1 335
x)	6·0	1 375	1 170	1 445	1 360	1 380
xi)	7·0	1 425	1 170	1 575	1 400	1 500
xii)	8·0	1 500	1 220	1 650	1 500	1 500
xiii)	10·0	1 600	1 320	1 700	1 600	1 565

3. MATERIAL

3.1 Materials specified in this standard shall comply with the requirements given below:

Material	*Class/Grade and Specification*
Mild steel	IS : 226 - 1975*
Grey iron castings	Grade FG 200 of IS : 210 - 1978†
Steel castings	Grade 26-52 of IS : 1030-1982‡
Steel forgings	Class 2 of IS : 2004-1978§
Phosphor bronze	Grade PBZ 10 of IS : 28-1975‖

4. BODY

4.1 The ladle body shall be of mild steel plate and shall be of thickness as specified in Tables 7, 8 and 9.

4.1.1 The sides and bottom of the ladle shall be constructed by welding. The bottom plate shall be cut from a single plate. If more than one plate is used for the sides, the vertical joint should be staggered. There shall be no circumferential joint below the trunnion axis. All welded joints on side plates shall be a double V-butt joint. Vertical joints on the side plates should not be in the zone of 30° of the trunnion axis and the axis perpendicular to the trunnion axis.

4.1.2 The bottom shall be adequately secured, by means of angle iron ring welded into position.

4.2 The ladle body shall be suitably vented with 6 to 8 mm diameter drilled holes at 250-300 mm square pitch.

4.3 The sides of the ladle shall be reinforced with a body holding ring, the size of which shall be as shown in Tables 7, 8 and 9. This ring shall be riveted, bolted or welded to the body with an air-gap as shown in Fig. 4. The minimum number of distance pieces shall be six. The body holding ring shall be cylindrical in shape and of parallel bore.

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*Specification for structural steel (standard quality) (*fifth revision*).

†Specification for grey iron castings (*third revision*).

‡Specification for carbon steel castings for general engineering purposes (*third revision*).

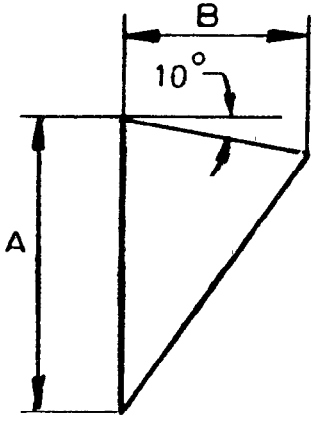
§Specification for carbon steel forgings for general engineering purposes (*second revision*).

‖Specification for phosphor bronze ingots and castings (*third revision*).

TABLE 7 SHELL PLATE THICKNESS, DIMENSIONS OF HAND OPERATING WHEELS, BODY HOLDING RINGS, REFRACTORY RETAINING RINGS, NOMINAL TRUNNION SHAFT DIAMETER, POURING LIPS FOR LIP POURING OPEN-TOP TAPER SIDED AND STRAIGHT SIDED LADLES FOR IRON AS WELL AS STEEL FOUNDRIES

(*Clauses* 4.1, 4.3, 8.6 *and* 9.1)

Sl No.	Capacity	Shell Plate Thickness		Hand Operating Wheel Diameter	Body Holding Ring Depth Thickness	Refractory Retaining Angle Size	Lip Dimensions in Case of Lip Pouring			Nominal Trunnion Shaft Diameter
		Side	Bottom				*A*	*B*	*C*	
(1)	(2) t	(3) mm	(4) mm	(5) mm	(6) mm	(7) mm	(8) mm	(9) mm	(10) mm	(11) mm
i)	0·25	5·0	6·0	460	100 × 12	—	200	100	200	60
ii)	0·5	5·0	6·0	460	100 × 12	—	200	100	200	60
iii)	0·75	5·0	6·0	460	100 × 12	—	200	100	200	60
iv)	1·0	6·0	8·0	540	150 × 16	50 × 50 × 6	400	100	400	70
v)	1·5	6·0	8·0	540	150 × 16	50 × 50 × 6	400	100	400	70
vi)	2·0	6·0	8·0	540	150 × 16	50 × 50 × 6	400	100	400	70
vii)	3·0	8·0	10·0	750	200 × 16	50 × 50 × 6	450	125	450	85
viii)	4·0	8·0	10·0	750	200 × 16	50 × 50 × 6	450	125	450	85
ix)	5·0	8·0	10·0	750	200 × 16	65 × 65 × 6	450	125	450	95
x)	6·0	12·0	16·0	900	250 × 20	65 × 65 × 6	500	150	500	95
xi)	7·0	12·0	16·0	900	250 × 20	65 × 65 × 6	500	150	500	110
xii)	8·0	12·0	16·0	900	250 × 20	65 × 65 × 6	500	150	500	110
xiii)	10·0	12·0	16·0	900	250 × 20	65 × 65 × 6	500	150	500	130



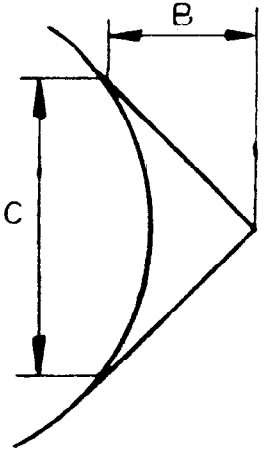
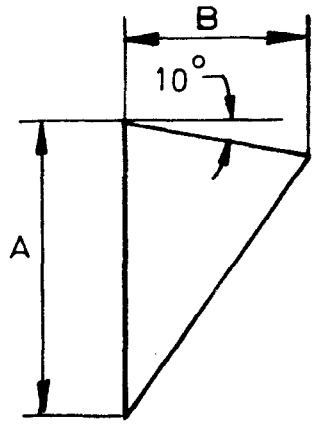


TABLE 8 SHELL PLATE THICKNESS, DIMENSIONS OF HAND OPERATING WHEELS, BODY HOLDING RINGS, COVERING PLATE AND POURING LIPS FOR LIP POURING COVERED TAPER SIDED AND STRAIGHT SIDED LADLES FOR IRON FOUNDRIES

(*Clauses* 4.1, 4.3, 8.6 *and* 9.1)

Sl No.	Capacity	Shell Plate Thickness		Hand Oparating Wheel Diameter	Body Holding Ring Depth Thickness	Lip Dimensions			Nominal Trunnion Shaft Diameter	Dimensions of Covering Plate in mm			
										Taper Sided		Straight Sided	
		Side	Bottom			*A*	*B*	*C*		Diameter	Thickness	Diameter	Thickness
(1)	(2) t	(3) mm	(4) mm	(5) mm	(6) mm	(7) mm	(8) mm	(9) mm	(10) mm	(11) mm	(12) mm	(13) mm	(14) mm
i)	0·25	5·0	6·0	460	100 × 12	200	100	200	60	465	50	460	50
ii)	0·5	5·0	6·0	460	100 × 12	200	100	200	60	610	50	550	50
iii)	0·75	5·0	6·0	460	100 × 12	200	100	200	60	665	50	610	50
iv)	1·0	6·0	8·0	540	150 × 16	400	100	400	70	715	75	675	75
v)	1·5	6·0	8·0	540	150 × 16	400	100	400	70	815	75	760	75
vi)	2·0	6·0	8·0	540	150 × 16	400	100	400	70	890	75	865	75



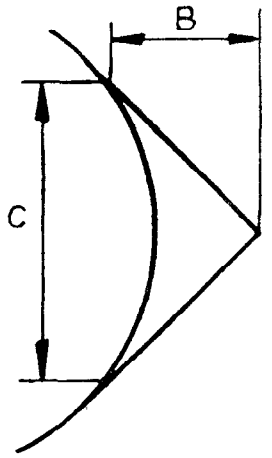
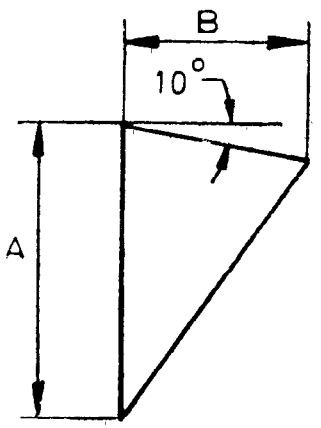
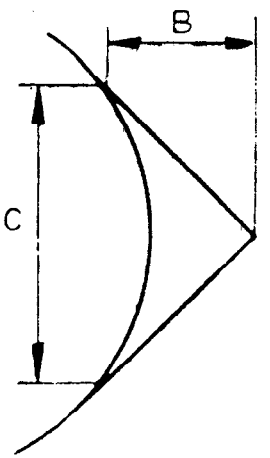


TABLE 9 SHELL PLATE THICKNESS, DIMENSIONS OF HAND OPERATING WHEELS, BODY HOLDING RINGS, COVERING PLATE AND POURING LIPS OF COVERED TAPER SIDED AND STRAIGHT SIDED LADLES FOR STEEL FOUNDRIES

(*Clauses* 4.1, 4.3, 8.6 *and* 9.1)

Sl. No.	Capacity	Shell Plate Thickness		Hand Operating Wheel Diameter	Body Holding Ring Depth, Thickness	Lip Dimensions			Nominal Trunnion Shaft Diameter	Dimensions of Covering Plate			
										Taper Sided		Straight Sided	
		Side	Bottom			*A*	*B*	*C*		Diameter	Thickness	Diameter	Thickness
(1)	(2) t	(3) mm	(4) mm	(5) mm	(6) mm	(7) mm	(8) mm	(9) mm	(10) mm	(11) mm	(12) mm	(13) mm	(14) mm
i)	0·25	5·0	6·0	460	100 × 12	200	100	200	60	510	50	570	50
ii)	0·5	5·0	6·0	460	100 × 12	200	100	200	60	610	50	660	50
iii)	0·75	5·0	6·0	460	100 × 12	200	100	200	60	660	50	715	50
iv)	1·0	6·0	8·0	540	150 × 16	400	100	400	70	715	75	760	75
v)	1·5	6·0	8·0	540	150 × 16	400	100	400	70	840	75	840	75
vi)	2·0	6·0	8·0	540	150 × 16	400	100	400	70	870	75	915	75





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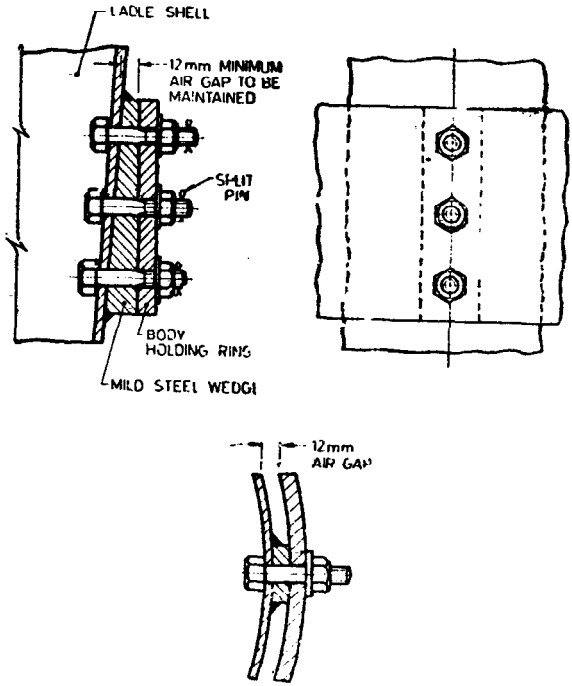

FIG. 4 FIXING ARRANGEMENT OF LADLE AND BODY HOLDING RING

4.4 For open-top ladles where a firebrick lining is required, a renewable refractory retaining ring shall be provided to the upper edge of the shell.

4.5 All welding shall be done in accordance with IS : 9595-1980*.

4.6 For covered ladles, the cover may either have 4 links or 3 links as shown in Fig. 5A or 5B.

4.6.1 The linkages should have machined pins at the fulcrum points. The linkages should not be fixed to the ladle shell but to the trunnion ring. The opening and closing of the cover should not require excessive force by the operator.

*Recommendations for metal arc welding of carbon and carbon manganese steels.

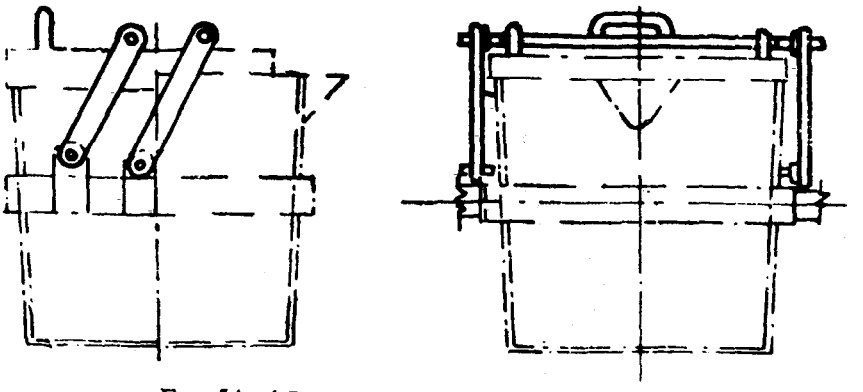

FIG. 5A 4-LINK SYSTEM FOR TOP COVER LADLE

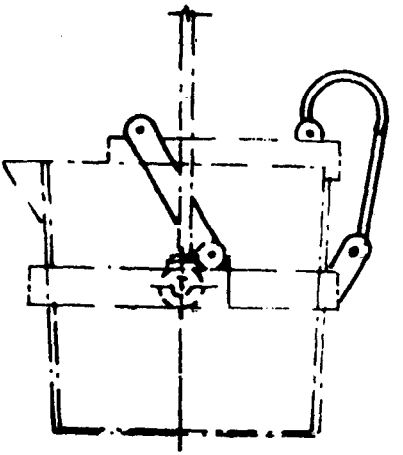

FIG. 5B 3-LINK SYSTEM FOR TOP COVER LADLE

4.6.2 The cover shall be lined on the inside to the same thickness as the ladle side. The lining thickness shall be as given in Tables 2 and 4.

5. BAIL

5.1 The bail comprising the top and side members and the hook-eye shall be so constructed as to permit the ladle to be turned through 360° at its horizontal axis.

5.2 The bail shall be of riveted or bolted construction.

5.2.1 The top member shall be formed of rolled or fabricated steel sections or steel plate, separated by the hook-eye in order to leave an air gap.

5.2.2 The side member shall be either a solid forging or made of rolled steel formed sections and shall be adequately secured. The side members shall be provided with T-heads for load bearing on the top members.

5.3 The trunnion carriers shall be bolted, riveted or welded with the load carrying side member.

5.4 The hook-eye shall be forged from a single piece of steel or fabricated from the plate conforming to IS : 226-1975* and shall be designed and attached to the cross member so that the load is borne by forging and not by the fastening bolts or rivets. The hook-eye shall be positioned so as to ensure that the ladle is vertical and in balance, when full of molten metal, to its specified capacity.

5.5 The hook-eye shall be sufficiently large to accommodate the lifting hook in use and shall have an adequate factor of safety. The maximum size of lifting hook to be employed shall be specified by the purchaser at the time of enquiry, depending on the crane hook by which the ladle is to be lifted.

6. TRUNNIONS

6.1 Trunnions shall be of steel forgings, steel castings or fabrication. The trunnion shall be riveted, bolted or welded to the ring. Where bolts or rivets are used, they shall pass through the ring and the body.

6.2 The trunnion shall be so located that the ladle is balanced on the trunnion when it is filled to its specified capacity.

6.2.1 If required, the information regarding exact location of the trunnions may be supplied by the manufacturer to the purchaser.

6.3 The trunnions shall be mounted on antifriction bearings. All bearings shall be suitably sealed against the ingress of extraneous matter with accessibility and adequate provision for lubrication.

6.4 The trunnions shall be protected against metal splashes by a suitable guard.

*Specification for structural steel (standard quality) (*fifth revision*).

7. SAFETY CATCHES

7.1 Safety catches shall be provided which, when engaged, prevent movement of the ladle and cross member relative to each other when the ladle is hanging or standing in an upright or inverted position.

7.2 Safety catches shall be supplied either as hinged forks or as pegs, as specified by the purchaser at the time of enquiry.

7.3 Safety catches shall be so designed as to operate freely and to be readily renewable when distorted or in an unsafe condition.

7.4 Safety catches shall be so located on the side member that, when closed, the forks or pegs are engaged at a distance of not more than 150 mm below the top of the ladle body.

7.5 Additional safety devices may be incorporated by agreement between the purchaser and the manufacturer.

8. TILTING GEAR

8.1 The tilting motion of ladles shall be controlled by suitable gearing, and it shall be in the same direction as the rotation of the handwheel. Back drive from the trunnion should not be possible under loaded ladle conditions.

8.1.1 If a worm gear is used, the worm shall be of steel and the worm-wheel of a suitable complementary material.

8.2 The gearing shall run in a sealed container, which may form a grease or oil bath or reservoir. The gearing shall be protected against the ingress of dirt and shall be adequately lubricated in all operating positions. The gearing shall be so designed as to permit movement of the body relative to the side members and cross member only by actuation of the handwheel.

8.3 Unless otherwise specified by the purchaser at the time of enquiry, gear ratio (number of handwheel turns for 360° turn of ladle) shall be left to the discretion of the manufacturer.

8.4 Bearings for all rotating parts shall be readily replaceable, irrespective of type.

8.5 All keys shall be secured in such a manner as to prevent them working loose accidentally.

8.6 Hand operating wheels shall be not less than the minimum diameter specified in Tables 7, 8 and 9.

8.6.1 The length of the handwheel shaft shall be specified by the purchaser at the time of enquiry. The form of attachment of the hand operating wheel, and the extension shaft, when this is specified by the purchaser, to the gear box shall be either tapered square or of some other equally effective design. The hand operating wheel and shaft shall be firmly located on the gear box shaft by a method, which permits them to be readily detachable.

9. LIP DESIGN

9.1 Lip pouring ladles shall be provided with two lips, the dimensions of which are given in Tables 7, 8 and 9. The purchaser shall specify at the time of enquiry whether the lips are to be welded to the ladle body.

10. SPOUT FOR TEAPOT - TYPE LADLE

10.1 The shell of the spout shall be of the same material and of the same thickness as that of the ladle body. The spout shall be welded to the ladle body.

11. FEET

11.1 To ensure suitable safety when the ladle, full or empty, is standing on the floor, suitable feet shall be provided depending upon the mutual agreement between the purchaser and the supplier.

12. INSPECTION

12.1 In case of welding in the suspension system, the weld may be subjected to radiographic examination, if required by the purchaser (*see* IS : 1182-1983* and IS : 2595-1978†).

12.2 If required by the purchaser, the forgings and castings used in the ladles may be radiographically/ultrasonically examined (*see* IS : 2595-1978† and IS : 7666-1975‡).

13. MARKING

13.1 Each ladle shall be clearly marked with the manufacturer's name or trade-serial number and the capacity of the ladle along with the term 'Iron' or 'Steel' indicating that the ladle is meant for the respective foundry.

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*Recommended practice for radiographic examination of fusion welded butt joints in steel plates (*second revision*).

†Code of practice for radiographic testing (*first revision*).

‡Recommended procedure for ultrasonic examination of ferrite castings of carbon and low alloy steel.

13.1.1 The ladle may also be marked with the Standard Mark.

NOTE — The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or processors, may be obtained from the Bureau of Indian Standards.

(*Continued from page* 2)

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